

DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
Quarterly Report

July 30, 2009

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FROM: Trevor Swanson, Project Manager, Environmental Assessment Program

THROUGH: George Onwumere, Unit Supervisor, Environmental Assessment Program

SUBJECT: Liberty Bay Tributaries Fecal Coliform TMDL Quarterly Report #3
Project Code: 08-023-03

Introduction

Liberty Bay and Johnson, Big Scandia, Little Scandia, Lemolo, Bjorgen, and Barrantes Creeks were listed by the Washington State Department of Ecology (Ecology) for exceeding Washington State fecal coliform (FC) bacteria criteria.

Ecology is required, under section 303(d) of the federal Clean Water Act and U.S. Environmental Protection Agency (EPA) regulations, to develop and implement Total Maximum Daily Loads (TMDLs) for impaired waters.

While the overall goal of the TMDL is to improve water quality in Liberty Bay, this study is focusing on the analysis of the freshwater creek and stormwater FC contributions to the bay. Ecology will be targeting freshwater sources most likely to contribute to marine FC but the TMDL cannot provide an estimate of the resulting change in FC concentrations at marine sampling locations in the bay.

This memorandum is the third in a series of four quarterly reports that summarizes FC data from August 2008 through June 2009. All data presented are provisional; data quality has not yet been checked.

Progress to Date

The final Liberty Bay TMDL Quality Assurance Project Plan (QAPP) was posted on the web in January 2009. It can be found at

<https://fortress.wa.gov/ecy/publications/SummaryPages/0903102.html>.

Data Collection

- Collected 20 to 34 membrane filtered FC samples during each of the 22 surveys completed from August 2008 through June 2009 (Table 1). About 20 percent of the samples were replicated for quality assurance purposes.
- Sampled all inputs to Liberty Bay during a dry weather sampling survey in October 2008 (Table 2).
- Sampled several investigatory sites 1 to 16 times from October 2008 through June 2009 (Table 2).
- Measured streamflow at most sites during bacteria sampling. Streamflows that were not measured in the field will be calculated using regression or estimated later.
- Measured in situ temperature and conductivity at all sites during regular bacteria sampling. Results are not included in this report.
- Completed a wet weather beach walk and outfall investigation documenting most of the outfalls and storm drains to Liberty Bay from Poulsbo, Keyport, and surrounding communities (March 2009).
- No rain events were sampled. Most rain events had too little rain, rain that fell when sampling was not possible, or did not have adequate preceding dry periods.

Data Results and Comparison to Washington Surface Water Quality Standards

Ecology reviewed the preliminary FC sample results collected from August through June and compared them to Washington State Surface Water Quality Standards (WAC-173-201A). Ecology detected violations of the geometric mean criterion at seven fixed-network sites and violations of the 90th percentile criterion at 21 of the fixed-network sites (Table 1). Geometric means and 90th percentiles were also calculated for investigatory sites with four samples or more (Table 2).

Project Schedule and Upcoming Tasks

- Ecology will continue tracking rainfall for storm/rain event sampling.
- One to two additional dry-period synoptic surveys are planned for summer/fall 2009.
- More investigatory sites may be sampled if deemed appropriate. Ecology may continue sampling investigatory sites that have already been sampled.
- Ecology is currently trying to arrange a tour of the Keyport Navy Facility and its stormwater outfalls.
- The next quarterly report will be available in October 2009.

Attachments:

Table 1. Preliminary FC sampling results at fixed-network sites in the Liberty Bay watershed.

Table 2. Preliminary FC sampling results at investigatory and dry-period survey sites in the Liberty Bay watershed.

Table 3. Site descriptions for Table 1.

Table 4. Site descriptions for Table 2.

Figure 1. Map of Liberty Bay watershed with site numbers referencing Tables 1 and 3.

Tables

Table 1. Fecal coliform (colony forming units per 100 mL) at regularly sampled stations (fixed-network sites) in the Liberty Bay watershed. Yellow and orange highlighted values do not meet Washington State surface water quality criteria. Map numbers reference Figure 1. Dashes denote no sample taken. For site descriptions, see Table 3.

Site ID w/ stream mile	Map #	Aug 12	Aug 26	Sept 10	Sept 24	Oct 8	Oct 22	Nov 11	Nov 24	Dec 10	Dec 29	Jan 14	Jan 28	Feb 11	Feb 25	Mar 11	Mar 24	Apr 8	Apr 29	May 6	May 20	Jun 9	Jun 17	n	Min	Max	Geo-metric mean	90th percent-ile
Dogfish Creek																												
15-DOG-0.6	1	65	110	43	66	88	32	63	52	21	390	17	19	24	31	12	15	13	11	280	130	250	92	22	11	390	48	185
15-SFD-0.0	2	360	120	26	31	84	12	65	9	290	540	31	180	190	280	18	32	11	1000	830	160	54	140	22	9	1000	88	537
15-SFD-1.3	3	61	72	170	71	140	46	41	8	330	340	29	66	130	170	3	6	1	140	640	130	110	380	22	1	640	64	515
15-EFD-0.0	4	180	80	51	34	220	92	51	4	10	68	5	2	30	15	30	5	18	3	180	140	890	110	22	2	890	34	269
15-EFD-1.2	5	60	67	16	29	9	4	3	12	51	130	9	5	51	7	4	10	31	14	170	75	61	61	22	3	170	22	102
15-WFD-0.0	6	75	180	110	31	18	18	43	45	23	270	9	14	10	33	10	25	3	44	51	140	74	40	22	3	270	34	136
15-WFD-0.9	7	57	80	19	28	13	18	37	30	17	170	4	1	4	6	6	8	1	7	35	140	60	510	22	1	510	19	140
Johnson Creek																												
15-JOH-0.1	8	8	120	4	140	220	2	11	1	1	87	190	3	15	17	6	2	1	15	120	27	24	53	22	1	220	14	144
Big Scandia Creek																												
15-BSC-0.0	9	180	110	14	40	80	40	56	3	31	230	5	17	44	43	13	56	2	23	380	180	240	210	22	2	380	43	272
15-BSC-0.1	10	79	110	36	35	88	20	6	2	44	260	9	6	24	56	80	52	2	9	250	250	340	200	22	2	340	38	278
15-BSC-1.1	11	35	110	6	10	28	7	11	2	1	55	14	5	12	110	9	5	4	3	340	140	200	400	22	1	400	19	170
15-BSC-1.6	12	84	72	32	31	88	7	3	9	1	340	14	40	11	41	24	4	2	4	170	200	74	110	22	1	340	24	187
Little Scandia Creek																												
15-LSC-0.1	13	1600	660	410	670	77	140	46	250	55	320	40	110	340	270	3	34	120	92	920	380	160	240	22	3	1600	162	940
15-LSC-0.4	14	920	150	260	640	180	160	41	3	6	100	6	99	28	67	4	9	15	40	760	180	120	17	22	3	920	56	507
Daniels Creek																												
15-DAN-0.0	15	590	62	540	450	450	100	29	15	23	23	17	10	20	120	18	280	20	9	550	130	110	1200	22	9	1200	77	571
15-DAN-0.2	16	420	92	940	200	80	65	10	44	18	51	2	8	1	6	1	5	7	6	62	30	96	670	22	1	940	27	338
Perry Creek																												
15-PER-0.1	17	530	550	69	77	80	9	71	3	17	220	23	26	29	74	77	200	20	7	500	200	84	520	22	3	550	66	438
Sam Snyder Creek																												
15-SAM-0.1	18	-	-	-	-	-	-	20	3	13	54	1	1	22	21	3	6	2	47	32	24	-	-	14	1	54	9	54
Lemolo Creek																												
15-LEM-0.1	19	84	77	3	7	18	22	2	6	5	150	21	6	7	5	1	6	14	190	960	800	120	150	22	1	960	22	260
Bjorgen Creek																												
15-BJO-0.1	20	3000	140	49	190	140	21	120	6	5	1100	14	6	27	53	6	7	4	17	490	80	280	230	22	4	3000	51	573
Barrantes Creek																												
15-BAR-0.0	21	450	190	810	190	270	20	110	13	3	90	4	27	8	11	12	1	24	62	240	48	51	170	22	1	810	42	392
Unnamed Tributaries to Liberty Bay																												
15-UNN-0.1	22	29	40	-	-	29	15	100	3	4	110	14	1	11	8	4	7	1	7	9	6	83	240	20	1	240	13	89
15-UNN-0.0	23	-	-	-	-	-	77	180	63	330	180	10	3	9	39	2	1	1	1	420	150	270	240	17	1	420	28	516

Table 2. Fecal coliform (colony forming units per 100 mL) at investigatory and dry-period survey sites in the Liberty Bay watershed. Yellow and orange highlighted values do not meet Washington State surface water quality criterion. Dashes denote no sample taken. For site descriptions, see Table 4.

Site ID w/ stream mile	Oct 29					Oct 22	Nov 11	Nov 24	Dec 10	Dec 29	Jan 14	Jan 28	Feb 11	Feb 25	Mar 11	Mar 24	Apr 8	Apr 29	May 6	May 20	Jun 9	Jun 17	n	Min	Max	Geo- metric mean	90th percent- tile	
"Dry storm" synoptic sampling survey																												
15-LEM-0.0	47					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
15-BJO-0.0	260					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-BAR-0.0	43					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-DOG-0.0	40					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-JOH-0.0	9					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-BSC-0.0	51					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-LSC-0.0	5600					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-PER-0.0	100					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-DAN-0.0	220					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-UN1-0.0	470					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-UNN-0.0	26					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-UN3-0.0	71					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-UN4-0.0	2					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15-JEA-0.0	8					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Investigatory sites																												
15-PET-0.0	-					89	-	-	160	110	8	86	26	190	3	64	22	21	57	59	-	-	13	3	190	43	199	
15-JEA-0.0	-					-	150	75	82	1300	3	220	69	1000	1	7	6	34	2900	370	200	49	16	1	2900	74	1305	
15-DON-0.0	-					-	-	-	370	11	1	21	140	8	13	14	12	5200	71	92	840	13	1	5200	47	876		
15-STORM-1	-					-	1500	-	880	-	-	-	160	-	-	-	-	1300	-	-	-	4	160	1500	724	2714		
15-STORM-2	-					-	-	-	1100	-	-	32	2100	-	-	-	-	1600	-	-	-	4	32	2100	586	7202		
15-UN3-0.0	-					-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-		
15-BST-0.0	-					-	-	-	760	200	60	11	110	230	88	8	130	100	2900	510	-	-	12	8	2900	134	1109	
15-KE1-0.2	-					-	-	-	-	-	23	-	-	51	-	1	-	-	-	380	640	1600	6	1	1600	88	2817	
15-KE2-0.3	-					-	-	-	-	-	2	-	-	6	-	10	-	-	-	57	55	160	6	2	160	20	165	
15-JOH-T	-					-	-	-	3	150	-	-	-	-	-	-	-	1	17	-	-	4	1	150	9	154		
15-BOV-0.0	-					-	-	-	-	-	-	-	-	-	-	-	23	100	31	150	660	200	6	23	660	106	521	
15-LMK-0.0	-					-	-	-	-	-	-	-	-	-	-	-	45	6000	2900	130	160	-	5	45	6000	439	6700	
15-NEL-0.0	-					-	-	-	-	-	-	-	-	-	-	-	3200	280	590	46	760	870	6	46	3200	502	3073	
15-RET-0.0	-					-	-	-	-	-	-	-	-	-	-	-	310	520	2300	700	330	54	6	54	2300	408	1972	

Table 3. Site descriptions for Table 1.

Site ID w/ stream mile	Map #	Site description
Dogfish Creek		
15-DOG-0.6	1	Mainstem behind dental office on Bond Rd., downstream of HWY 305 crossing
15-SFD-0.0	2	South fork at Bond Rd. and 1st Ave., 50 ft. downstream of culvert
15-SFD-1.3	3	South fork at 8th Ave. and Iverson, upstream side of culvert
15-EFD-0.0	4	East fork at Little Valley Rd., downstream side of culvert
15-EFD-1.2	5	East fork off Bond Rd. at Pugh Rd.,upstream side of culvert
15-WFD-0.0	6	West fork at Little Valley Rd., downstream side of culvert
15-WFD-0.9	7	West fork at first Big Valley Rd. crossing near Living Waters Farm, up of culvert
Johnson Creek		
15-JOH-0.1	8	Mainstem south of Norfin Ln., 200ft. downstream of tributary
Big Scandia Creek		
15-BSC-0.0	9	Mainstem at mouth near the end of Scandia Ct. at private property. Trail to ck.
15-BSC-0.1	10	Mainstem at Scandia Rd, upstream side of bridge
15-BSC-1.1	11	Mainstem at HWY 308 between Viking Way and Cox Ave., downstream of culvert
15-BSC-1.6	12	Mainstem at HWY 308 just west of Cox Ave., upstream side of culvert
Little Scandia Creek		
15-LSC-0.1	13	Mainstem at Scandia Rd. behind church, upstream side of culvert
15-LSC-0.4	14	Mainstem at Blomster Way, upstream side of culvert
Daniels Creek		
15-DAN-0.0	15	Mainstem off HWY 308, near residence at 14510, upstream side of culvert
15-DAN-0.2	16	Mainstem at Virginia Loop Rd., approximately 30ft. below culvert
Perry Creek		
15-PER-0.1	17	Mainstem at 90 deg. right turn in Thorpe Rd. upstream side of culvert
Sam Snyder Creek		
15-SAM-0.1	18	Mainstem at Lemolo Shore Dr., downstream side of culvert (dry during dry season)
Lemolo Creek		
15-LEM-0.1	19	Mainstem at Lemolo Shore Dr. east of Delate Rd. Access from first private drive east of creek, 75 ft. upstream of culvert
Bjorgen Creek		
15-BJO-0.1	20	Mainstem at Lemolo Shore Dr. by market, downstream side of culvert
Barrantes Creek		
15-BAR-0.0	21	Mainstem at Lemolo Shore Dr. downstream of culvert. Sample at low tide
Unnamed Tributaries to Liberty Bay		
15-UNN-0.1	22	Trib. east of Daniels Ck. at Hwy 308 near "Support Our Troops" sign. 30ft.upstream of culvert
15-UNN-0.0	23	Trib. flowing into bay right next to Daniels Ck. mouth. Sample at low tide.

Table 4. Site descriptions for Table 2.

Site ID w/ stream mile	Site description
"Dry storm" synoptic sampling survey	
15-LEM-0.0	Lemolo Creek mouth
15-BJO-0.0	Bjorgen Creek mouth
15-BAR-0.0	Barrantes Creek mouth
15-DOG-0.0	Dofish Creek mouth
15-JOH-0.0	Johnson Creek mouth
15-BSC-0.0	Big Scandia Creek mouth
15-LSC-0.0	Little Scandia Creek mouth
15-PER-0.0	Perry Creek mouth
15-DAN-0.0	Daniels Creek mouth
15-UN1-0.0	15-UNN-0.1 mouth
15-UNN-0.0	Trib. flowing into bay south of and next to Daniels Ck. mouth.
15-UN3-0.0	Small, unnamed stream flowing into Dogfish Bay, east of station 15-UNN-0.1
15-UN4-0.0	Small stream flowing through Fish Park into Dogfish Creek near mouth, below 15-DOG-0.6
15-JEA-0.0	Small, unnamed stream flowing into the bay near American Legion Park (Poulsbo outfall PSW31)
Investigatory sites	
15-PET-0.0	Trib. east of Perry Ck. at Thorpe Rd. Sample at low tide above culvert. Dry during dry season
15-JEA-0.0	Small, unnamed stream flowing into the bay near American Legion Park. Poulsbo outfall ID is PSW31
15-DON-0.0	"Donna Jean's Creek" at Poulsbo Yacht Club
15-STORM-1	Storm drain at the south end of American Legion Park. Below the Gran Kirk, Martha and Mary, and Front St. Poulsbo outfall PSW30.
15-STORM-2	next storm drain north of STORM-1 (metal culvert)
15-UN3-0.0	Small, unnamed stream flowing into Dogfish Bay, east of station 15-UNN-0.1
15-BST-0.0	Small unnamed seasonal stream flowing into Liberty Bay ~300 feet east of Big Scandia Creek.
15-KE1-0.2	Small, unnamed ck. near Keyport Creek (1st trib. at Brownsville Hwy)
15-KE2-0.3	Keyport Creek (2nd trib. at Brownsville Hwy)
15-JOH-T	Trib. to Johnson Creek above 15-JOH-0.1
15-BOV-0.0	Trib to Liberty Bay between Bovela St. and Bay St.
15-LMK-0.0	Small, intermittent stream off Virginia Lp. Rd. NE at private prop.
15-NEL-0.0	Nelson Park bioswale at beach
15-RET-0.0	Small, unnamed ck. flowing through assisted living facility property off Viking Way in Poulsbo, near Bovela St. Sample at beach.

Figures

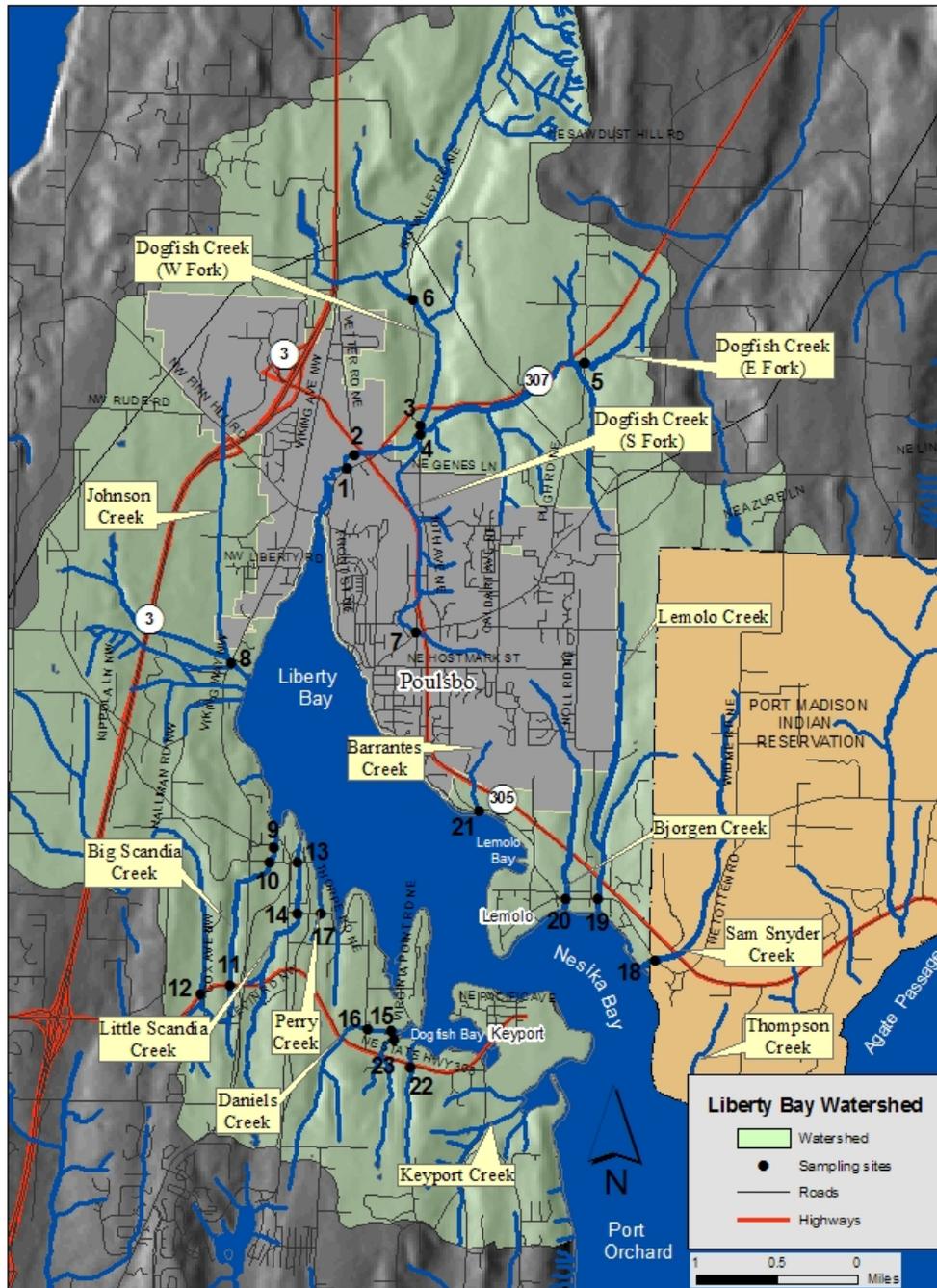


Figure 1. Map of Liberty Bay and Nesika Bay watersheds, including tributaries to Agate Passage and Port Orchard Bay. Numbers reference Tables 1 and 3.